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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/519,981	01/03/2005	Etsuo Fujita	500.44577X00	3206

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EXAMINER	
ROE, JESSEE RANDALL	

ART UNIT	PAPER NUMBER
1742	

MAIL DATE	DELIVERY MODE
08/30/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/519,981	FUJITA ET AL.	
	Examiner	Art Unit	
	Jessee Roe	1742	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 January 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *See Continuation Sheet*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Specification

Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

The disclosure is objected to because it appears to be a literal translation into English from a foreign document and is replete with grammatical and idiomatic errors. Correction is required. See MPEP § 702.01(c).

Information Disclosure Statement

The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609.04(a) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 1 recites the limitation "the metal structure" in 1. There is insufficient antecedent basis for this limitation in the claim.

Claims 2-3 recite the limitation "the structural section" in claims 2-3. There is insufficient antecedent basis for this limitation in the claim.

Claim 11 recites the limitation "the structural section" in claim 11. There is insufficient antecedent basis for this limitation in the claim.

Claim 11-12 recites the limitation "the metal structure" in claim 11-12. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-9 and 11-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beyer et al. (GB 1 482 724).

In regards to claim 1, Beyer et al. (GB '724) disclose an alloy that would be used as a sliding part with a composition relative to the composition of instant invention as shown below (pg. 1, col. 2, line 47 – pg. 2, col. 1, line 9).

Element	From Instant Claims (in mass percent)	Beyer et al. (GB '724) (in weight percent)	Overlapping range
C	0.4 – less than 1.5	1.5 – 4.0	1.5
Si	0.1 – 3.0	1.5 – 6.0	1.5 – 3.0
Mn	0.1 – 3.0	0.05 – 2.5	0.1 – 2.5
Cr	0 – 0.5	0.3 – 2.5	0.3 – 0.5
Ni	0.05 – 3.0	0.4 – 3.2	0.4 – 3.0
Al	0.3 – 2.0	0.1 – 2.0	0.3 – 2.0
Mo + W + V	0.3 – 20	0.5 – 12	0.5 – 12
Cu	0.05 – 3.0	1.0 – 7.0	1.0 – 3.0
Fe	Balance	Balance	Balance

The Examiner notes that the composition disclosed by Beyer et al. (GB '724) overlaps the composition of the instant invention, which is a prima facie case of obviousness. See MPEP 2144.05 I. It would have been obvious to one of ordinary skill in the art at the time the invention was made to select the claimed compositions of silicon, manganese, chromium, nickel, aluminum, molybdenum, tungsten, vanadium, and copper from the compositions disclosed by Beyer et al. (GB '724) because Beyer et al. (GB '724) disclose the same utility throughout the disclosed ranges.

Still regarding claim 1, the Examiner notes that the carbon composition of the instant invention (i.e. less than 1.5 mass percent carbon) would not be patentably distinct from the carbon composition of the steel alloy disclosed by Beyer et al. (GB '724) (i.e.1.5 mass percent carbon). See Titanium Metals Corp. of America v. Banner, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985).

Still regarding claim 1 and in regards to claim 2, Beyer et al. (GB '724) do not

specify that the graphite particles would have an average size of not more than 3 μm or that the graphite particles observed in the structural section would occupy an area rate of not less than 1% in the overall area of the structural section. However, Beyer et al. (GB '724) disclose a heat treatment above 700°C, followed by quenching and subsequent tempering, which is a process that is substantially similar to that of the instant invention. Therefore, an average graphite size of not more than 3 μm and graphite particles observed in the structural section occupying an area rate of not less than 1% in the overall area of the structural section would be expected. See MPEP 2112.01 I.

In regards to claim 5, Beyer et al. (GB '724) disclose 0.1 to 2.0 weight percent aluminum, which overlaps the range of 0.7 – 2.0 mass percent aluminum as in the instant invention (pg. 1, col. 2, line 47 – pg. 2, col. 1, line 9).

In regards to claim 6, Beyer et al. (GB '724) disclose 0.1 to 4.0 weight percent molybdenum, which overlaps the range of 1.5 to 3.0 mass percent molybdenum as in the instant invention (pg. 1, col. 2, line 47 – pg. 2, col. 1, line 9).

In regards to claim 7, Beyer et al. (GB '724) disclose 0.4 to 3.2 weight percent nickel and/or cobalt, which is not more than 10 mass percent cobalt as in the instant invention (pg. 1, col. 2, line 47 – pg. 2, col. 1, line 9).

In regards to claim 8, Beyer et al. (GB '724) disclose less than 0.2 weight percent sulfur, which is not more than 0.3 mass percent sulfur as in the instant invention (pg. 1, col. 2, line 47 – pg. 2, col. 1, line 9).

In regards to claim 9, the recitation "not more than 0.01 % Ca" includes 0 mass

percent calcium. Beyer et al. (GB '724) do not specify wherein the alloy would contain calcium. Therefore, Beyer et al. (GB '724) inherently satisfy this limitation.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Beyer et al. (GB 1 482 724) as applied to claim 1, and further in view of the ASM Handbook Volume 4.

In regards to claim 10, Beyer et al. (GB '724) disclose an alloy as shown above and suggests the presence of nitrides (pg. 2, col. 2, lines 26-34), but Beyer et al. (GB '724) do not specify nitriding.

The ASM Handbook Volume 4 discloses nitriding a ferrous alloy in order to obtain a high surface hardness, an improved fatigue life, and a surface resistant to the softening effect of heat at temperatures up to the nitriding temperature (pg. 387).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply nitriding to a ferrous alloy, as disclosed by the ASM Handbook Volume 4, which would include the ferrous alloy, as disclosed by Beyer et al. (GB '724), in order to obtain a high surface hardness, an improved fatigue life, and a surface resistant to the softening effect of heat at temperatures up to the nitriding temperature, as disclosed by the ASM Handbook Volume 4 (pg. 387).

In regards to claim 11, Beyer et al. (GB '724) disclose an alloy in the form of strips (wire) that would be used as piston rings with a composition relative to the composition of instant invention as shown on the following page (pg. 1, col. 1 – pg. 2, col. 1).

Element	From Instant Claims (in mass percent)	Beyer et al. (GB '724) (in weight percent)	Overlapping range
C	0.4 – less than 1.5	1.5 – 4.0	1.5
Si	0.1 – 3.0	1.5 – 6.0	1.5 – 3.0
Mn	0.1 – 3.0	0.05 – 2.5	0.1 – 2.5
Cr	0 – 0.5	0.3 – 2.5	0.3 – 0.5
Ni	0.05 – 3.0	0.4 – 3.2	0.4 – 3.0
Al	0.3 – 2.0	0.1 – 2.0	0.3 – 2.0
Mo + W + V	0.3 – 20	0.5 – 12	0.5 – 12
Cu	0.05 – 3.0	1.0 – 7.0	1.0 – 3.0
Fe	Balance	Balance	Balance

The Examiner notes that the composition disclosed by Beyer et al. (GB '724) overlaps the composition of the instant invention, which is a prima facie case of obviousness. See MPEP 2144.05 I. It would have been obvious to one of ordinary skill in the art at the time the invention was made to select the claimed compositions of silicon, manganese, chromium, nickel, aluminum, molybdenum, tungsten, vanadium, and copper from the compositions disclosed by Beyer et al. (GB '724) because Beyer et al. (GB '724) disclose the same utility throughout the disclosed ranges.

Still regarding claim 11, the Examiner notes that the carbon composition of the instant invention (i.e. less than 1.5 mass percent carbon) would not be patentably distinct from the carbon composition of the steel alloy disclosed by Beyer et al. (GB '724) (i.e.1.5 mass percent carbon). See Titanium Metals Corp. of America v. Banner, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985).

Still regarding claim 11 and in regards to claim 12, Beyer et al. (GB '724) do not specify that the graphite particles would have an average size of not more than 3 μm; that the sulfide inclusions observed in the structural section would be parallel to the periphery of the piston ring and distributed such that straight lines each passing through

a major axis of the respective sulfide inclusion would cross one another within a cross angle of not more than 30 degrees; or that the graphite particles observed in the structural section would occupy an area rate of not less than 1% in the overall area of the structural section. However, Beyer et al. (GB '724) disclose a heat treatment above 700°C, followed by quenching and subsequent tempering, which is a process that is substantially similar to that of the instant invention. Therefore, an average graphite size of not more than 3 μm; the sulfide inclusions observed in the structural section would be parallel to the periphery of the piston ring and distributed such that straight lines each passing through a major axis of the respective sulfide inclusion would cross one another within a cross angle of not more than 30 degrees; and graphite particles observed in the structural section occupying an area rate of not less than 1% in the overall area of the structural section would be expected. See MPEP 2112.01 I.

In regards to claim 13, Beyer et al. (GB '724) disclose 0.4 to 3.2 weight percent nickel and/or cobalt, which is not more than 10 mass percent cobalt as in the instant invention (pg. 1, col. 2, line 47 – pg. 2, col. 1, line 9).

In regards to claim 14, Beyer et al. (GB '724) disclose less than 0.2 weight percent sulfur, which is not more than 0.3 mass percent sulfur as in the instant invention (pg. 1, col. 2, line 47 – pg. 2, col. 1, line 9).

In regards to claim 15, the recitation "not more than 0.01 % Ca" includes 0 mass percent calcium. Beyer et al. (GB '724) do not specify wherein the alloy would contain calcium. Therefore, Beyer et al. (GB '724) inherently satisfy this limitation.

Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Beyer et

al. (GB 1 482 724) as applied to claim 11, and further in view of the ASM Handbook Volume 4.

In regards to claim 16, Beyer et al. (GB '724) disclose an alloy that would be used for piston rings as shown above and suggests the presence of nitrides (pg. 2, col. 2, lines 26-34), but Beyer et al. (GB '724) do not specify nitriding.

The ASM Handbook Volume 4 discloses nitriding a ferrous alloy in order to obtain a high surface hardness, an improved fatigue life, and a surface resistant to the softening effect of heat at temperatures up to the nitriding temperature (pg. 387).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply nitriding to a ferrous alloy, as disclosed by the ASM Handbook Volume 4, which would include the ferrous alloy, as disclosed by Beyer et al. (GB '724), in order to obtain a high surface hardness, an improved fatigue life, and a surface resistant to the softening effect of heat at temperatures up to the nitriding temperature, as disclosed by the ASM Handbook Volume 4 (pg. 387).

Claims 1-4 and 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iwamoto et al. (JP 07-188847).

In regards to claim 1, Iwamoto et al. (JP '847) disclose an alloy that would be in machines (which would include sliding parts) with a composition relative to the composition of instant invention in the table on the following page ([0020] and abstract).

Element	From Instant Claims (in mass percent)	Iwamoto et al. (JP '847) (in mass percent)	Overlapping range
C	0.4 – less than 1.5	0.1 – 1.5	0.4 – less than 1.5
Si	0.1 – 3.0	0.5 – 2.0	0.5 – 2.0
Mn	0.1 – 3.0	0.1 – 2.0	0.1 – 2.0
Cr	0 – 0.5	0.05 – 1.0	0.05 – 0.5
Ni	0.05 – 3.0	0.1 – 3.0	0.1 – 3.0
Al	0.3 – 2.0	0.01 – 0.5	0.3 – 0.5
Mo	0.3 – 20	0.05 – 0.5	0.3 – 0.5
Cu	0.05 – 3.0	0.1 – 3.0	0.1 – 3.0
Fe	Balance	Balance	Balance

The Examiner notes that the composition disclosed by Iwamoto et al. (JP '847) overlaps the composition of the instant invention, which is a prima facie case of obviousness. See MPEP 2144.05 I. It would have been obvious to one of ordinary skill in the art at the time the invention was made to select the claimed compositions of carbon, silicon, manganese, chromium, nickel, aluminum, molybdenum, and copper from the compositions disclosed by Iwamoto et al. (JP '847) because Iwamoto et al. (JP '847) disclose the same utility throughout the disclosed ranges.

Still regarding claim 1, Iwamoto et al. (JP '847) disclose graphite particles sizes that would be less than 3 μm ([0045], [0050], [0055] and Tables 3, 6, and 8).

In regards to claim 2, Iwamoto et al. (JP '847) disclose wherein 10% or more of graphite phase would be present in the steel alloy [0044].

In regards to claim 3, Iwamoto et al. (JP '847) disclose wherein vanadium would not be required as an element within the steel alloy ([0020] and abstract). The Examiner asserts that without vanadium, vanadium carbides would not be present.

In regards to claim 4, Iwamoto et al. (JP '847) disclose that one or more of 0.05 to 1.0 mass percent chromium and 0.05 to 0.5 mass percent molybdenum would

be included in the steel alloy, which overlaps the 0.3 to 5.0 total mass percent of molybdenum and tungsten ([0020] and abstract).

In regards to claim 7, the recitation "not more than 10% of Co" includes 0 mass percent cobalt. Iwamoto et al. (JP '847) do not specify wherein the alloy would contain cobalt. Therefore, Iwamoto et al. (JP '847) inherently satisfy this limitation.

In regards to claim 8, Iwamoto et al. (JP '847) disclose that 0.03 to 0.25 mass percent sulfur would be present in the steel alloy, which is not more than 0.3 mass percent sulfur ([0020] and abstract).

In regards to claim 9, Iwamoto et al. (JP '847) disclose that 0.0002 to 0.30 mass percent calcium would be included in the steel alloy, which overlaps the range of not more than 0.01 mass percent calcium (abstract).

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Iwamoto et al. (JP 07-188847) as applied to claim 1, and further in view of the ASM Handbook Volume 4.

Iwamoto et al. (JP '847) disclose a material that would be used for machines (which would include sliding parts) as shown above, but Iwamoto et al. (JP '847) do not specify wherein the material would be subjected to nitriding.

The ASM Handbook Volume 4 discloses nitriding a ferrous alloy in order to obtain a high surface hardness, an improved fatigue life, and a surface resistant to the softening effect of heat at temperatures up to the nitriding temperature (pg. 387).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply nitriding to a ferrous alloy, as disclosed by the

ASM Handbook Volume 4, which would include the ferrous alloy disclosed by Iwamoto et al. (JP '847), in order to obtain a high surface hardness, an improved fatigue life, and a surface resistant to the softening effect of heat at temperatures up to the nitriding temperature, as disclosed by the ASM Handbook Volume 4 (pg. 387).

Claims 11-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iwamoto et al. (JP 07-188847) in view of Lee (US 2,014,440).

In regards to claim 11, Iwamoto et al. (JP '847) disclose an alloy that would be used for machines (which would include sliding parts) with a composition relative to the composition of instant invention in the table below ([0020] and abstract).

Element	From Instant Claims (in mass percent)	Iwamoto et al. (JP '847) (in mass percent)	Overlapping range
C	0.4 – less than 1.5	0.1 – 1.5	0.4 – less than 1.5
Si	0.1 – 3.0	0.5 – 2.0	0.5 – 2.0
Mn	0.1 – 3.0	0.1 – 2.0	0.1 – 2.0
Cr	0 – 0.5	0.05 – 1.0	0.05 – 0.5
Ni	0.05 – 3.0	0.1 – 3.0	0.1 – 3.0
Al	0.3 – 2.0	0.01 – 0.5	0.3 – 0.5
Mo	0.3 – 20	0.05 – 0.5	0.3 – 0.5
Cu	0.05 – 3.0	0.1 – 3.0	0.1 – 3.0
Fe	Balance	Balance	Balance

The Examiner notes that the composition disclosed by Iwamoto et al. (JP '847) overlaps the composition of the instant invention, which is a prima facie case of obviousness. See MPEP 2144.05 I. It would have been obvious to one of ordinary skill in the art at the time the invention was made to select the claimed compositions of carbon, silicon, manganese, chromium, nickel, aluminum, molybdenum, and copper from the compositions disclosed by Iwamoto et al. (JP '847) because Iwamoto et al. (JP '847) disclose the same utility throughout the disclosed ranges.

Still regarding claim 11, Iwamoto et al. (JP '847) disclose an alloy that would be used in machine as shown above, but Iwamoto et al. (JP '847) do not specify wherein the alloy would be used as a wire for piston rings.

Lee ('440) disclose wherein carbon steel containing 0.8 to 0.9 weight percent carbon would be preferred for piston rings (pg. 1, col. 1, line 1 – pg. 1, col. 2, line 10). Lee ('440) further discloses that rings having 0.8 – 0.9 weight percent carbon would perform satisfactorily with respect to elasticity, toughness, and high temperatures (pg. 1, col. 1, line 1 – pg. 1, col. 2, line 10).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the shape of the steel alloy, as disclosed by Iwamoto et al. (JP '847), into piston rings, as disclosed by Lee ('440), in order to produce piston rings that would perform satisfactorily with respect to elasticity, toughness, and high temperatures (pg. 1, col. 1, line 1 – pg. 1, col. 2, line 10).

Still regarding claim 11, Iwamoto et al. (JP '847) disclose graphite particles sizes that would be less than 3 μm ([0045], [0050], [0055] and Tables 3, 6, and 8).

In regards to the recitation "wherein sulfide inclusions observed in the structural section, being parallel to the periphery of the piston ring, are distributed such that straight lines each passing through a major axis of the respective sulfide inclusion cross one another within a cross angle of not more than 30 degrees which angle is referred to as a degree of parallelism", the Examiner asserts that Iwamoto et al. (JP '847) disclose a substantially similar process of fabrication [0044]. Therefore, sulfide inclusions observed in the structural section, being parallel to the periphery of the piston ring, are

distributed such that straight lines each passing through a major axis of the respective sulfide inclusion cross one another within a cross angle of not more than 30 degrees. See MPEP 2112.01 I.

In regards to claim 12, Iwamoto et al. (JP '847) disclose wherein 10% or more of graphite phase would be present in the steel alloy [0044].

In regards to claim 13, the recitation "not more than 10% of Co" includes 0 mass percent cobalt. Iwamoto et al. (JP '847) do not specify wherein the alloy would contain cobalt. Therefore, Iwamoto et al. (JP '847) inherently satisfy this limitation.

In regards to claim 14, Iwamoto et al. (JP '847) disclose that 0.03 to 0.25 mass percent sulfur would be present in the steel alloy, which is not more than 0.3 mass percent sulfur ([0020] and abstract).

In regards to claim 15, Iwamoto et al. (JP '847) disclose that 0.0002 to 0.30 mass percent calcium would be included in the steel alloy, which overlaps the range of not more than 0.01 mass percent calcium ([0020] and abstract).

Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Iwamoto et al. (JP 07-188847) in view of Lee (US 2,014,440), and further in view of the ASM Handbook Volume 4.

Iwamoto et al. (JP '847) in view of Lee ('440) disclose a material that would be used for piston rings as shown above, but Iwamoto et al. (JP '847) in view of Lee ('440) do not specify wherein the material would be subjected to nitriding.

The ASM Handbook Volume 4 discloses nitriding a ferrous alloy in order to obtain a high surface hardness, an improved fatigue life, and a surface resistant to the

softening effect of heat at temperatures up to the nitriding temperature (pg. 387).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply nitriding to a ferrous alloy, as disclosed by the ASM Handbook Volume 4, which would include the ferrous alloy used for piston rings, as disclosed by Iwamoto et al. (JP '847) in view of Lee ('440), in order to obtain a high surface hardness, an improved fatigue life, and a surface resistant to the softening effect of heat at temperatures up to the nitriding temperature, as disclosed by the ASM Handbook Volume 4 (pg. 387).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jessee Roe whose telephone number is (571) 272-5938. The examiner can normally be reached on Monday-Friday 7:30 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dr. Roy V. King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JR

ROY KING
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700

Continuation of Attachment(s) 3). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date :3 January 2005, 1 April 2005, and 7 September 2006.